Outline for
OFFICE OF NAVAL RESEARCH

ANNUAL PROGRESS REPORT

Report Prepared By: G. W. Wharton

Date: 27 January 1954
For period 1 January to
31 December 1953

NR: 132-022

CONTRACT: N7-ONR-45506

ANNUAL RATE: $2,281 ($5,563.00 for four-year period)

CONTRACTOR: Duke University, Durham, N. C.

PRINCIPAL INVESTIGATOR: G. W. Wharton, Prof. and Head, Department of Zoology, University of Maryland

Assistants: Miss Flora Gorirossi, Junior Instructor, University of Maryland

TITLE OF PROJECT: The Comparative Anatomy of the Mouth Parts of Mesostigmatid Mites.

Objectives: The numerous species of mites that comprise the suborder Mesostigmata are so imperfectly known that their classification, evolutionary trends, and structural adaptations for feeding are largely undetermined. Mesostigmatid mites are diverse in their habits. Species included in the group are pests of man and his domestic animals, vectors of disease, parasites, predators and important components of the fauna of the soil. It is anticipated that knowledge of the comparative anatomy of the mouth parts of these mites will make it possible to explain their adaptations for feeding and the evolutionary trends by which these adaptations were attained. These explanations will lead to a better understanding of the significance of a species in the natural economy and will provide a basis for improving the classification of the group.

SUMMARY OF RESULTS

a. Since start of project: The skeletal elements and the more apparent muscles of the gnathosoma of twelve species of mesostigmatid mites have been studied at least in part. Examples of eight of the eleven recognized phyletic lines that comprise the mesostigmatid mites have been compared. The feeding behavior of three species in three different lines has been observed. As a result of these studies, it has been possible to name the elements that make up the gnathosoma in a logical fashion so that homologous structures in different mites can be given a uniform nomenclature. This has been done in connection with six of the forms studied. Superficial studies of the mouth parts have been made on a number of mites. In this connection it has been found that certain but not all of the Laelaptidae possess a long, grooved epipharynx that may serve for injection of material into the host. It is interesting that Laelaps jettmari Vitzthum, 1930, one of the mites suspected of being involved in the epidemiology of haemorrhagic fever, has one of the best developed epipharyngeal grooves. A study of the Berlese collection has been completed and a revision of the eleven previously recognized phyletic lines is in progress. It now appears that these eleven lines can be reduced to three.

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Three factors are now recognized as influencing observed modifications of the gnathosoma. Sexual differences have been noted associated especially with the chelicerae in those forms that use the chelicerae for transferring the spermatophores from the males to the females. Modifications of the entire gnathosoma have been found to be associated with adaptive trends in feeding habits. Consistent differences in certain structures have been found to be characteristic of certain phyletic lines.

b. During the current report period: A comparative morphological understanding of the mesostigmata has evolved from intense research into the eleven groups designated as the Mesostigmata. As a result of detailed notes and drawings of the type material found in the Berlese Collection in Firenze, Italy, plus information received in conferences held with the leading acarologists in Switzerland, Belgium, England, France and Italy, much information has been disseminated among American acarologists interested in specific mesostigmatid groups. A revision of the Mesostigmata is being undertaken in collaboration with Dr. Joseph Camin of the Chicago Academy of Sciences, as an outgrowth of the present project and the Berlese study. A long, grooved epipharynx has been found to be characteristic of certain of the Laelaptid mites. This structure is in a position to penetrate the host during the feeding process. Efforts to obtain live mites that possess this structure so that they can be cultured have so far not been successful.

PLANS FOR FUTURE:

Immediate: Complete project by 1 June 1954.

REPORTS AND PUBLICATIONS (During Current Report Period):

Semiannual Progress Report, 1 July to 31 December 1952.
Semiannual Progress Report, 1 January to 30 June 1953.
1953 Gorirossi, Flora and G. W. Wharton, The anatomy of the feeding apparatus of Megisthanus floridanus Banks, 1904, a large Mesostigmatid mite. Am. Midl. Nat. 50:433-448.*

*Reprints will be submitted as soon as they are available.